National Character Area profile:

27. Yorkshire Wolds

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Introduction

As part of Natural England's responsibilities as set out in the Natural Environment White Paper[1], Biodiversity 2020[2] and the European Landscape Convention[3], we are revising profiles for England's 159 National Character Areas (NCAs). These are areas that share similar landscape characteristics, and which follow natural lines in the landscape rather than administrative boundaries, making them a good decision-making framework for the natural environment.

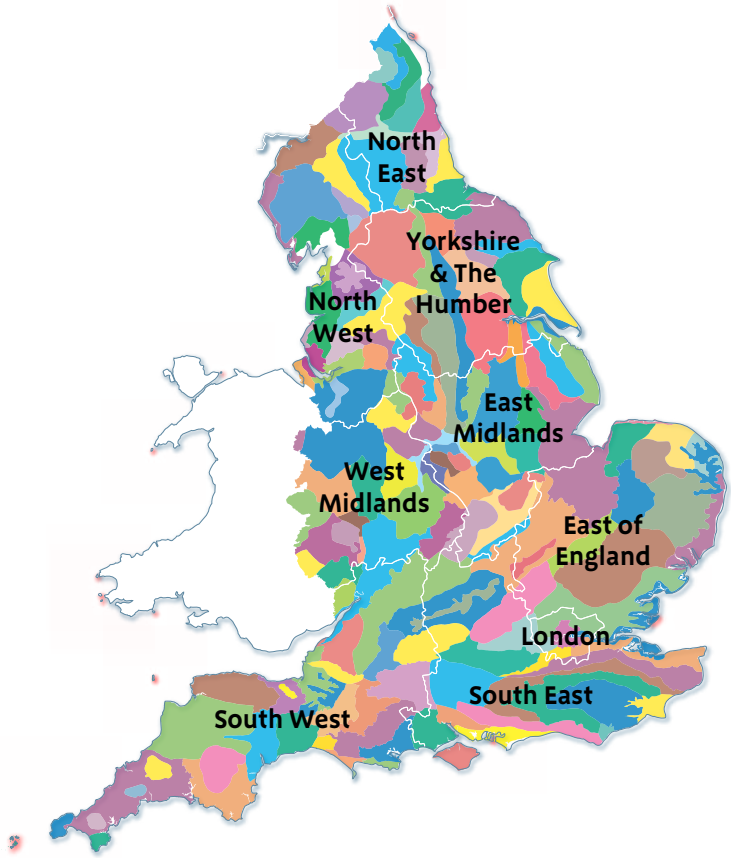
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and encourage broader partnership working through Local Nature Partnerships. The profiles will also help to inform choices about how land is managed and can change.

Each profile includes a description of the natural and cultural features that shape our landscapes, how the landscape has changed over time, the current key drivers for ongoing change, and a broad analysis of each area's characteristics and ecosystem services. Statements of Environmental Opportunity (SEOs) are suggested, which draw on this integrated information. The SEOs offer guidance on the critical issues, which could help to achieve sustainable growth and a more secure environmental future.

NCA profiles are working documents which draw on current evidence and knowledge. We will aim to refresh and update them periodically as new information becomes available to us.

We would like to hear how useful the NCA profiles are to you. You can contact the NCA team by emailing **ncaprofiles@naturalengland.org.uk**

National Character Areas map



[1] The Natural Choice: Securing the Value of Nature, Defra (2011; URL: www.official-documents.gov.uk/document/cm80/8082/8082.pdf)

[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)

[3] European Landscape Convention, Council of Europe (2000; URL: http://conventions.coe.int/Treaty/en/Treaties/Html/176.htm)

Summary

The Yorkshire Wolds National Character Area (NCA) forms an arc of high, gently rolling ground extending from the Humber Estuary west of Hull, to the North Sea coast at Flamborough Head, north of Bridlington. The Wolds comprise a prominent chalk escarpment and foothills rising from the Vale of York to the west and the Vale of Pickering to the north, and falling to the plain of Holderness to the east. A very low proportion of the area is urban and woodland, and the vast majority of the land is agricultural. Woodland planting is restricted to small, scattered woodland blocks on higher land and steeper slopes

This gently rolling landscape instils a sense of openness, escapism and tranquillity provided by the expansive views, sparse population and agriculture. Protection of the rural character and long, open views is important for conservation of this distinctive landscape. Respect for local building vernacular is essential; they are mainly brick, limestone and chalk.

Eastwards, the NCA arcs to meet the North Sea at the high chalk cliffs of Flamborough Head, designated as Heritage Coast for its landscape, recreational and cultural values. Flamborough Head is also a European Marine Site, a Special Protection Area (SPA) for its breeding coastal birds and a Special Area of Conservation (SAC) for chalk reef and caves. Methods of fishing and extraction of natural materials are prohibited off the headland in order to protect marine wildlife and heritage, and to safeguard local fish stocks. It is also a geological SSSI for its spectacular chalk cliffs. There are coastal footpaths that offer opportunities for coastal recreation, which could be extended in the long term.

The area has a varied cultural and historical heritage, with evidence of extensive settlement from the Neolithic to the Late Medieval Period – the rich prehistoric ritual landscape at Rudston, numerous bronze-age burial mounds, iron-age ladder settlements and deserted medieval villages.

Extensive tracts of arable land dominate the NCA due to the thin, chalky soils and there is some livestock rearing, including pigs, sheep, cattle and chicken. Increased demand for food may bring the introduction of new crops and longer cropping seasons but sustainable farming practices need to be followed to protect water, soil and biodiversity resources.

Because of the underlying permeable chalk, this landscape has no major rivers, but its calcareous waters flow into the river headwaters of adjoining NCAs such as the River Hull in Holderness NCA. The chalk aquifer underlying the NCA supplies drinking water and allows irrigation of arable land but it suffers from pollution and over-abstraction. Calcareous grasslands occur on the steep-sided valleys, which can help to filter water, improving water quality and preventing soil erosion. These grasslands are often species-rich and attract many species of butterflies and moths. The Wolds represent the most northerly outcrop of Chalk in Britain and therefore accommodate the northern extent of the range of many species.

Click map to enlarge; click again to reduce.

Statements of Environmental Opportunity:

- **SEO 1**: Enhance, extend and manage the unique assemblage of chalk-based habitats (lowland chalk grasslands, streams), broadleaved woodland and maritime cliffs, while protecting the provision and quality of water.

- **SEO 2**: Manage the coastal landscape of Flamborough Head with its diversity of cliffs, geology, geomorphology and habitats (including important seabird colonies), and enhance people's enjoyment of it through increased opportunities for recreation and education.

- **SEO 3**: Improve opportunities to enhance people's enjoyment of the area while protecting high levels of tranquillity by conserving extensive views and intimate, steep-sided valleys which contribute to sense of place, and by protecting and promoting the extensive historic evidence of past human settlement, landscape change and designed landscapes.

- **SEO 4**: Maintain a sustainable but productive arable landscape, while expanding and connecting semi-natural habitats to benefit biodiversity, and soil and water quality by promoting good agricultural practice, extending grasslands along field margins and slopes, implementing extensive grazing regimes, and ensuring compliance with regulations on nitrate vulnerable zones (NVZs) to manage fertiliser inputs.

Expansive views towards the coast from the elevated chalk ridge, north-east near Huggate.

Bempton cliffs provide important habitat for colonies of internationally important seabirds such as guillemots and kittiwakes.

Description

Physical and functional links to other National Character Areas

The headwaters of the River Hull rise in the Wolds and flow east into the Holderness plain. Streams arising on the northern side of the Wolds, such as Settrington Beck, drain into the Vale of Pickering, and rivers arising on the west drain into the Vale of York. The Humber Estuary National Character Area (NCA) – one of Britain's largest estuaries, draining one-fifth of the land mass of England – lies to the south of this NCA, and the streams that arise in the Wolds eventually drain into the sea through the Humber. Along the elevated chalk ridge, strong visual links with adjacent NCAs create expansive views over Holderness, the Vale of Pickering and the Vale of York.

The coastline extends into the North Sea at Flamborough Head, one of the world's most important fishing grounds, and contains frontal systems that attract fish, birds and cetaceans. The Flamborough Front provides an important marine feeding ground supporting large colonies of seabirds of national and international importance, while the cliffs of Flamborough and Bempton provide their habitats.

Key characteristics

- A large-scale, expansive, rolling landscape with big skies and long views from the escarpment and plateau, contrasting with the more enclosed, dry, sheltered valleys deeply incised into the Chalk, but with small areas of Lower Cretaceous, Jurassic and Triassic rocks along the western and northern fringes.
- Thin, chalky soils support mainly arable farming, with a pattern of large, regular fields crossed by long, straight drove roads with wide verges dating from Parliamentary enclosures of the 18th century. The arable farmland is a priority area for important farmland bird species, while many of the grass verges have calcareous grassland interest providing valuable wildlife corridors.
- The high chalk cliffs of Flamborough Head, where the land meets the North Sea, are designated as Heritage Coast, for the dramatic landscape and recreation value. It is also a European Marine Site, a Special Protection Area (SPA) for breeding coastal birds, and a Special Area of Conservation (SAC) for chalk reef and cave interest, with Sites of Special Scientific Interest (SSSIs) of geological and geomorphological importance.
- Remnant tracts of sheep-grazed, unimproved or semi-improved calcareous grassland in steep-sided, dry valleys form distinctive landscapes, with hillsides of floristically rich grasslands, which provide specialist habitats for butterflies and moths.
- Woodland cover is generally limited, and often linked to steep slopes within enclosed valleys, although there are a number of estates with more significant woodland areas, including Dalton, Garrowby, Sledmere, Londesborough and Warter Priory. Shelterbelts associated with farmsteads are features on the skyline.
- There are many large estates and designed parklands with large country houses, estate villages, estate woodlands and medieval deer parks.
- Other features include wet flushes, wet meadows and spring-fed fens at the foot of the escarpments, and remnant wetlands and wet meadows adjacent to the chalk streams.
- It is generally a sparsely settled landscape with large, scattered farmsteads on high ground, small villages in valleys and small market towns on fringes. Building materials are predominantly brick with pantiles, but sometimes limestone and chalk.
- Throughout the NCA, there is extensive evidence of a long history of human occupation and landscape change represented by numerous Neolithic, bronze-age and iron-age monuments and medieval settlements.
- A number of chalk, sand and gravel quarries and gravel pits are found throughout the NCA, which are of biodiversity value and provide access for study and education.

The Yorkshire Wolds today

The Yorkshire Wolds is a deeply rural, predominantly chalk landscape rising in a prominent escarpment from the Vale of York to the west and the Vale of Pickering to the north. From high points above the scarp, the landscape of rolling hills falls away gently to the east, eventually merging into the lower-lying, flatter landscape of Holderness. Along the western fringes of the chalk outcrop, two separate areas of Jurassic and Triassic deposits create a series of foothills to the Wolds. The Chalk creates a range of features which give unity to the whole of the area, including the main escarpment, dry valleys and soil that is thin, dry and white when exposed by ploughing. Unimproved chalk grassland would once have been widespread but is now confined to a few locations on the steepest slopes of the dry valleys.

At its eastern extremity, the Chalk reaches the North Sea in the Upper Cretaceous chalk cliffs of Flamborough Head. Designated a geological SSSI, the area comprises the highest chalk cliffs in Britain due to the hardness of the chalk. It is also designated a Heritage Coast accessible via a coastal path, providing tourism and recreation opportunities; an SAC for chalk reef and sea caves; and an SPA for large numbers of breeding seabirds, including kittiwakes and auks, as well as the only mainland breeding colony of gannets in the United Kingdom. The seabirds feed and raft in the waters around the cliffs, outside the SPA, as well as feeding more distantly in the North Sea. The intertidal chalk platforms are also used as roosting sites, particularly at low water and notably by juvenile kittiwakes. Remnant areas of cliff-top grassland are found here and, while agriculture is the main coastal land use, semi-natural, coastal grassland habitats buffer the cliff edge.

The unifying influence of the Chalk gives the whole of the Wolds a particularly strong identity. High on the Wolds plateau, the landscape is large-scale and generally open with big skies being a notable feature. Fields are gently rolling with generally well-maintained but insubstantial hedgerows. Tree and woodland cover is limited, which adds to the sense of openness. The chalk escarpment facing west to the Vale of York and north to the Vale of Pickering is broad and sinuous. In some places, it is intensively farmed but elsewhere woodlands create variety, especially where valleys cut into the scarp. Where the escarpment turns to run due south, it is particularly complex and well-wooded with a strong sense of enclosure.

The large-scale landscape of the Wolds plateau with low woodland cover provides openness, except for scattered shelterbelts often associated with farmsteads.

The Wolds plateau is dissected by numerous deeply incised valleys, which provide a sense of intimacy in contrast to the openness provided high on the plateau. Unimproved chalk grasslands, characteristic of the Wolds, occur on the steep side slopes of the dry valleys, and were once more widespread. Twenty sites are designated as SSSIs, and these are located above Pocklington, around Thixendale and in the north-eastern area at Fordon. They support a mosaic of calcium-loving plant species such as salad burnet, wild thyme and field scabious, and butterflies and moths such as the grayling and cistus forester. There are also many designated Local Wildlife Sites (LWS) throughout the NCA.

Millington Wood. A small number of calcareous ash woodlands are of nature conservation and recreational importance while creating variety and enclosure.

Woodland cover is limited with scattered shelterbelts, often providing shelter to the large farmsteads on the plateau, and dale-head plantations. A small number of calcareous ash woodlands are of nature conservation importance, such as Millington Wood which supports rich ancient woodland flora, and clusters of woodland with veteran trees largely occurring on estates and parklands.

The Wolds are home to Britain's most northerly chalk streams, including the headwaters of the River Hull (SSSI) which flows around Driffield into the Holderness plain. These streams and spring-fed flushes occur in several valleys and along the western escarpment. Abstraction of groundwater from the underlying chalk aquifer has the potential to cause diminished flows in a number of streams. The clear waters of the chalk rivers are a significant nature conservation feature supporting characteristic plant communities, a diversity of invertebrates and the white-clawed crayfish.

The thin, chalky soils, good grazing and light tree cover made the Wolds an attractive area for Neolithic settlers, evidenced by the remains of burial mounds, and defensive and boundary structures. Today, extensive tracts of arable land dominate the landscape, especially on the plateau and gentle slopes of the High Wolds. Field sizes are often large, bounded by well-trimmed hedgerows. A number of declining farmland bird species and a range of rare arable flora occur within the farmland. Overall, agricultural Grades 2 and 3 soils are predominant, and this is reflected in the arable farming which covers 73 per cent of the farmed area. The main crops grown are cereals and oil seeds, with limited livestock rearing but large numbers of pig units.

Generally, the NCA is sparsely populated with villages nestled in valleys or hollows. Traditional buildings in long-established villages are constructed of brick and pantiled roof buildings. Limestone is sometimes used in the west and

chalk appears in older buildings, notably near Flamborough Head, Flixton and Muston. The villages in the narrow belt of the Jurassic foothills are predominantly built of limestone, with red brick detailing and red pantiles.

In this remote landscape, the Yorkshire Wolds Way National Trail, a long distance route from Hull to Filey Brigg, provides an important recreation opportunity. Long and short walks can be enjoyed throughout the NCA and two national cycle routes pass through: the Way of the Roses, running coast to coast from Morecambe Bay to Bridlington Bay and a circular route known as the Yorkshire Wolds Cycle Route running from Beverley to Market Weighton.

Sledmere Estate. Traditional buildings are constructed of brick and pan-tiled roofs.

The big skies and a sense of openness high on the Wolds, enhanced by the absence of people and the dark night skies, give a sense of escapism and tranquillity. Where the plateau dips eastwards, long views can be seen over Holderness, while from the scarp slope on the west there are long views out over the Humberhead Levels and Vale of York. The scale and openness of the Wolds has been captured in recent times by renowned artist David Hockney in his popular large-scale landscape paintings such as 'Bigger Trees Near Water'.

The landscape through time

The portion of the Chalk Group remaining in the Yorkshire Wolds represents strata deposited during the Upper Cretaceous between approximately 100 million and 80 million years ago. Older rocks – Triassic and Jurassic in age – underlie the Chalk Group and crop out to the north and east. Exploitation of the Chalk Group for lime, cement, building stone, brick and aggregate has created inland exposures where these rocks are visible. Several of these exposures have been designated as SSSI because of their importance to the earth sciences. The most extensive and comprehensive exposures are, however, the cliffs of Flamborough Head SSSI.

Along the western edge of the NCA, the contrasting outcrop of mudstones, sandstones and limestones produce low escarpments and hills. Pleistocene coversands, which are present in the south, produce light, sandy soils, while tills resting on chalk in the Flamborough area give rise to the bevelled cliff tops. At Market Weighton in the neighbouring Holderness NCA, an important geological structure caused most of the Jurassic sequence of rocks to thin out, leaving only the lowermost (Lias Group) beds. They reappear approximately 10 km to the north. North of Market Weighton, these underlying rocks are folded, creating a complex area of foothills, while further south is a clear escarpment.

The thin, chalk soils, good grazing and light tree cover of the Wolds, combined with the availability of stone suitable for making tools, made this an attractive area for early Neolithic settlers. There is evidence of widespread settlement at that time in the remains of burial mounds, as well as defensive and boundary structures.

The Wolds have rich evidence of prehistoric occupation and land use with internationally important Neolithic ritual landscapes, numerous bronze-age burial monuments, and iron-age square barrow cemeteries, ladder settlements and earthwork boundaries. There were recurrent periods of settlement in Roman, Saxon, Danish and Norman times. Many of the medieval settlements on the Wolds were deserted or shrunk due to movement of people and changes in land use. Settlements deserted in the Medieval Period survive as earthwork sites such as Hanging Grimston, and many of today's villages shrunk rather than disappeared altogether, such as Huggate.

The Wolds have been continuously modified since Neolithic times. Until about 1700 AD, much of the area was still unenclosed open fields, predominantly sheepwalks and pastures. Daniel Defoe at this time likened the landscape to the more southerly chalk landscape of the Downs around Salisbury. There were few, if any, hedges or walls and virtually no settlement, at least on the hills and plateau.

Parliamentary enclosure of these open-field landscapes came rather later to the Wolds than to the adjacent vale landscapes of Holderness and the Vale of York. When enclosure came, it brought many of the features of today's landscape; hedges were planted to enclose large, regular fields; new large, brick-built farmsteads appeared scattered across the open farmland and well away from traditional villages and roads and, because of their exposed

The Wolds has a history of recurrent periods of settlement including deserted medieval settlements like Wharram Percy.

position, they were often surrounded by distinctive shelterbelts. New straight, wide drove roads were also built with wide grass verges. All of these features can still be seen today.

In the Wolds, the absence of surface water resulted in the most significant settlements establishing around the fringes and along the spring lines to east and west, especially in the Great Wold Valley. The presence of ponds was at one time essential for the survival of the valley villages and a number of these remain, including dew ponds on the dry plateau. The villages are usually predominantly brick-built, with pantile roofs, although limestone is sometimes

used in the west. Chalk also appears in many older buildings, notably near Flamborough Head which is one of the few areas where the chalk is hard enough for building. There are also estate villages, many with prominent churches associated with the parkland and estate landscapes of the country houses, which often include deer parks and estate woodlands developed in the 18th and 19th centuries. Notable examples include Sledmere, South Dalton and Warter.

Outside the villages, in the Parliamentary enclosure period, imposing brick farmsteads are typical features dispersed across the plateau. The villages in the narrow belt of Jurassic foothills are predominantly stone built. The traditional building material here is limestone with red brick detailing and red pantiles. Many of the villages have particular strength of character because of the combination of traditional stone buildings with mature trees and old features such as market crosses, greens and drystone boundary walls.

The well-drained, productive, chalk soil has suited arable farming. The most extensive uptakes in agri-environment schemes up to 2003 related to calcareous grassland and regeneration of grassland/semi-natural vegetation. Higher land within the western and northern areas has seen an increase in woodland planting, with several small, scattered woodland blocks being planted on upper slopes between 1999 and 2003. Other recent changes include wind farm developments.

Ecosystem services

The Yorkshire Wolds NCA provides a wide range of benefits to society. Each is derived from the attributes and processes (both natural and cultural features) within the area. These benefits are known collectively as 'ecosystem services'. The predominant services are summarised below. Further information on ecosystem services provided in the Yorkshire Wolds NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision**: The NCA is important for food production. Arable farming dominates the NCA, with 73 per cent of the farmed area being used for cereals and other arable crops. Large farms over 100 ha, dominate, and comprise 85 per cent of the farmed area. The largest numbers of livestock are pigs.

Arable farming dominates the Wolds with approximately 70 per cent of the farmed area being used for cereal production.

- **Water availability**: Although this is a dry landscape, it is an important catchment as the underlying chalk aquifer supplies water to the Yorkshire and Humber region; the eastern coastal part of the aquifer is over-licensed which could affect the river flows of adjoining NCAs.

Regulating services (water purification, air quality maintenance and climate regulation)

- **Regulating soil erosion**: The most vulnerable areas regarding soil erosion are on the steep valley slopes under arable production, particularly at times when there are high-intensity downpours when crops are establishing or during harvesting. Planting green cover crops or permanent grasslands on field margins and slopes can reduce this erosion.

- **Regulating soil quality**: Some 49 per cent of the NCA has high-quality Grade 2 agricultural soils on gently sloping hills of the eastern slopes. Cultivation practices should address the organic content of soils, for example by extending grasslands where appropriate and ensuring that nutrient inputs are carefully managed, adhering to nitrate vulnerable zone (NVZ) guidelines.

- **Regulating water quality**: The chemical quality of groundwater (including the chalk aquifer) is classified as poor throughout the NCA. The reduction of diffuse agricultural pollution through nitrates will improve the quality of groundwater and northerly chalk streams.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: The strong sense of place is evoked by the expansive rolling hills and long views which instil a sense of openness contrasted with enclosed, hidden, steep-sided valleys. The strong rural character of the area, along with its light settlement patterns, gives it a sense of remoteness. The coastline is rugged and dramatic with expansive sea views at Flamborough Head and Bempton.

- **Sense of history**: There is a strong sense of history across the Wolds from the prehistoric monuments and extensive evidence of human land use from the Neolithic Period, to the 18th-century enclosure landscape of today. The Wolds has a high number of Scheduled Ancient Monuments, a strong collection of listed buildings and six registered parks and gardens such as Sledmere House and Londesborough Park.

Despite a low density of public rights of way, there are opportunities to link permissive paths to strategic routes.

On the coast, the dramatic high chalk cliffs of Flamborough Head meet the North Sea.

- **Recreation**: Although there is a low density of public rights of way, there are recreational opportunities through the Yorkshire Wolds Way, and the two national cycle routes – the Way of the Roses and the Yorkshire Wolds Cycle Route. Shorter, circular routes and easy-access walks are also established and have the potential to increase over time by making more links from permissive paths and bridleways to the main walking routes.

  The coastline of Flamborough is popular with visitors and includes the RSPB Bempton Cliffs Nature Reserve, which is visited for its high numbers of breeding seabirds and interesting sea caves. The introduction of the Coastal Access Scheme may provide an opportunity to extend the National Trail designation from Filey to Speeton (which includes Flamborough Head). The large estates of Sledmere and Burton Agnes offer visitors a cultural, historical and recreational experience.

- **Geodiversity**: Geology and geomorphological processes are significant factors influencing the topography and hydrology of the area. There are eight geological SSSI, four of which contain designated biological interests. Most of these are exposed chalk quarries providing insights into the deep past and sources of fossils. The most extensive natural geodiversity site is Flamborough Head SSSI which provides a spectacular backdrop and habitat. These Upper Cretaceous chalk cliffs of Flamborough Head and Bempton include Staple Newk, a fault line which is visible from the sea. Bempton itself comprises the highest of the chalk cliffs in Britain, reflecting the fact that the chalk in this area is much harder than that of southern Britain. A common feature of the Chalk sequence is the presence of bands of marl, a calcareous mudstone.

Statements of Environmental Opportunity

SEO 1: Enhance, extend and manage the unique assemblage of chalk-based habitats (lowland chalk grasslands, streams), broadleaved woodland and maritime cliffs, while protecting the provision and quality of water.

For example, by:

- Enhancing biodiversity and strengthening landscape character by protecting and expanding the extent of species-rich chalk grasslands, creating grasslands to buffer key sites while reducing nutrient influences from cultivated land, and creating or restoring broadleaved woodland where appropriate.
- Creating and managing grassland buffer strips along watercourses and consider reverting arable land to grassland on steeper slopes to reduce soil erosion and nutrient run-off in arable areas, and to create buffers and links to existing sites of biodiversity interest, particularly those adjacent to the tributaries of the River Hull draining to the east.
- Restoring and enhancing riverside wetland habitats on narrow valley floors, and retaining areas of extensively managed wet grasslands, especially across the floor of winterbourne channels and relict small-scale field patterns.
- Enhancing/improving chalk-based aquatic habitats by managing rivers, streams and flushes to maintain hydrological processes, enhance water quality and provision, and maintain the biodiversity of related plant and invertebrate communities.
- Maintaining and improving the chalk aquifer for public water supply, its long-term resilience and water storage, by working with the local farming community to adopt sustainable farming practices and to improve filtration into the ground and reduce nutrient run-off through the creation or restoration of a network of grasslands.
- Seeking out opportunities for biodiversity enhancement from mineral extraction sites, for example by the creation of chalk grassland through suitable restoration schemes and managing disused chalk quarries such as Kiplingcotes for their biodiversity value.
- Seeking out opportunities for discovering more Local Geological Sites and improving access to sites for education and recreation.
- Seeking opportunities to buffer, connect and expand semi-natural habitats by planting nectar-rich seed mixes and grassland strips, and by managing roadside verges to create an ecological network, linking habitats where possible and benefiting a wealth of wildlife, including skylarks, butterflies and moths (marbled white, brown argus and cistus forester).
- Through landscape-scale partnerships, undertaking joint initiatives in the adjoining National Character Areas (NCAs) to protect the water quality and supply of groundwater of the northerly chalk streams of the Yorkshire Wolds and the headwaters in adjoining NCAs into which they flow.

SEO 2: Manage the coastal landscape of Flamborough Head with its diversity of cliffs, geology, geomorphology and habitats (including important seabird colonies), and enhance people's enjoyment of it through increased opportunities for recreation and education.

For example, by:

- Seeking opportunities to restore, expand and improve ecological links between chalk grassland on the cliff tops of Flamborough Head and to maintain them through extensive grazing regimes.
- Protecting the coastal spring flushes of significant botanical interest on the Flamborough Headland.
- Protecting and positively managing geological and geomorphological features, including exposures, disused quarries, landforms and river processes.
- Maintaining the habitats for populations of migratory bird species (kittiwake) and seabirds that contribute to the breeding seabird assemblage of European importance, with particular reference to maintaining the coastal cliffs, chalk reefs and sea caves and ensure links with implementation of the Flamborough Head European Marine Site management scheme.
- Managing the Heritage Coast at Flamborough Head and Bempton, enabling the local community and visitors to enjoy access, good facilities and opportunities for recreation and to enjoy the interpretation of the unique geological heritage and wildlife of the coast.
- Expanding the coastal path to link to the Cleveland Way (Filey to Speeton) as part of the Coastal Access Scheme.
- Allowing the natural retreat of the cliff line at Flamborough Head, thus enabling internationally designated sites to evolve under natural processes.

SEO 3: Improve opportunities to enhance people's enjoyment of the area while protecting high levels of tranquillity by conserving extensive views and intimate, steep-sided valleys which contribute to sense of place, and by protecting and promoting the extensive historic evidence of past human settlement, landscape change and designed landscapes.

For example, by:

- Encouraging more people to visit the distinctive open countryside for quiet enjoyment and by developing new educational 'tracker packs', reconnecting people with the importance of the landscape, geodiversity and biodiversity for provisioning and cultural services, along with new educational access sites linked to the Yorkshire Wolds Way, Way of the Roses and Yorkshire Wolds Cycle Route.
- Ensuring that significant built developments do not adversely impact on the historic interest, recreational enjoyment and open character of the area, helping to maintain panoramic views and a sense of 'escapism' on the distinctive chalk topography, particularly the escarpment.
- Maintaining the lightly settled character and traditional settlement pattern of medieval villages traditionally located along spring lines, and later, estate villages and scattered farmsteads.
- Encouraging the use of traditional building materials (brick and pantiled roof buildings, with limestone to the west and chalk near Flamborough Head), to retain the connection between the local vernacular and the underlying geology, and restoring and maintaining existing traditional buildings of brick, chalk or cobble barns and model/stud farms.
- Improving access to and interpretation of historic sites and features for local communities and visitors to understand and enjoy the heritage surrounding them, and revealing their role in the development of the landscape over time.
- Maintaining the visible and hidden finite resource of past human landscape change, land use and settlement – for example, the extensive prehistoric, ritual landscapes, later iron-age and medieval settlements, and 18th-century landscape reorganisation.
- Managing medieval deer parks and post-medieval designed parkland associated with the large estates, including restoration of vistas and care of veteran trees.
- Improving and extending access to recreation for a wide range of users by developing shorter circular routes linked to historic sites, cycle routes, bridleways and National Trails, and by introducing educational packs for schoolchildren.

SEO 4: Maintain a sustainable but productive arable landscape, while expanding and connecting semi-natural habitats to benefit biodiversity, and soil and water quality by promoting good agricultural practice, extending grasslands along field margins and slopes, implementing extensive grazing regimes and ensuring compliance with regulations on nitrate vulnerable zones (NVZs) to manage fertiliser inputs.

For example, by:

- Encouraging farmers and landowners in the Yorkshire Wolds (and immediately adjoining NCAs) to restore and create semi-natural habitats to improve water infiltration and reduce nitrate input – for example, through take-up of environmental stewardship arable options, extending grasslands along field margins and slopes to prevent sediment run-off, and improving water quality, biodiversity and pollination.
- Encouraging management interventions on arable farmland to benefit farmland bird species such as grey partridge, lapwing, turtle dove, yellow wagtail, tree sparrow, corn bunting, quail, barn owl and yellowhammer.
- Developing an integrated package of catchment sensitive farming initiatives along the headwaters of the River Hull and Settrington Beck/ River Derwent.
- Promoting good management of existing hedges and hedgerow trees, filling in gaps and allowing them to fill out.
- Improve soil quality and manage soil erosion by reducing cultivation on slopes and establishing permanent grassland where possible, increasing the organic content of soils by using green cover crops, and encouraging extensive grazing regimes on soils most vulnerable to compaction.
- Conserving archaeological features through land management practices – for example, through reversion of arable to grassland where land management threatens the integrity of earthworks and below-ground archaeology and by encouraging scrub removal on earthworks (Neolithic, bronze and iron-age monuments).

Additional opportunity

1: Create new native woodlands to extend the habitat network, while respecting open views of the NCA, linking these areas to other woodlands, semi-natural habitats, scrub, hedgerows and species-rich grassland.

For example, by:

- Where appropriate, creating new native, calcareous ash woodlands to link with the existing resource and with hedgerows, while carefully avoiding potentially impacting on semi-natural, species-rich grassland.
- Bringing existing woodlands into appropriate active management.
- Identifying barriers to movement between woodland patches and close these links where appropriate with natural regeneration, new native planting of woodland or hedgerows and allowing scrub to develop in non-species-rich grassland.
- Maintaining diverse woodland structures in calcareous ash woodlands and, where appropriate, supporting the practice of coppicing.
- Ensuring that new woodlands are created in appropriate places so that they contribute to landscape character, thus providing shelter for farmsteads, although enclosing the open plateau areas or intruding on skylines should be avoided.
- Creating riparian woodland along watercourses and wider catchment planting on the lower eastern slopes to help promote rainfall infiltration into the soil, reducing water pollution and sediment run-off.

Supporting document 1: Key facts and data

Total area: 111,422 ha

1. Landscape and nature conservation designations

The Yorkshire Wolds NCA includes the Flamborough Headland Heritage Coast covering 3,170 ha or 3 per cent of the NCA area.

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	Percentage of NCA
International	Ramsar	Humber Estuary	4	<1
European	Special Protection Area (SPA)	Flamborough and Bempton Cliffs SPA, Humber Estuary SPA		<1
	Special Area of Conservation (SAC)	Flamborough Head SAC, Humber Estuary SAC		<1
National	National Nature Reserve (NNR)	n/a	0	0
	Site of Special Scientific Interest (SSSI)	A total of 38 sites wholly or partly within the NCA	1,022	1

Source: Natural England (2011)

Please note: (i) Designated areas may overlap (ii) all figures are cut to Mean High Water Line, designations that span coastal areas/views below this line will not be included.

There are 282 Local sites in Yorkshire Wolds NCA covering 3,493 ha which is 3 per cent of the NCA.

Source: Natural England (2011)

- Details of individual Sites of Special Scientific Interest can be searched at: http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm
- Details of Local Nature Reserves (LNR) can be searched at: http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_search.asp
- Maps showing locations of statutory sites can be found at: http://magic.defra.gov.uk – select 'Designations/Land-Based Designations/Statutory'

1.2 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of SSSI in category condition
Unfavourable declining	57	6
Favourable	270	27
Unfavourable no change	12	1
Unfavourable recovering	676	67

Source: Natural England (March 2011)

- Details of SSSI condition can be searched at: http://www.sssi.naturalengland.org.uk/Special/sssi/reportIndex.cfm

2. Landform, geology and soils

2.1 Elevation

The maximum height of the hills is around 250 m dropping down to sea level at Flamborough Head and the Humber Estuary.

Source: Natural England (2012)

2.2 Landform and process

The Wolds form a long ridge of rolling hills. The scarp slope rises steeply from the Vale of Pickering to the north and the Vale of York and Humberhead Levels to the west. The dip slope grades gradually into the Holderness Plain to the east.

Source: Yorkshire Wolds Countryside Character Area Description

2.3 Bedrock geology

The Yorkshire Wolds is largely underlain by the Chalk Group deposited during the Late Cretaceous between 100 and 65 million years ago, with earlier Jurassic and Triassic rocks at the base along the western escarpment and Jurassic and Lower Cretaceous rocks along the northern escarpment. The most important geological feature of the area is the Market Weighton Axis, over which most of the Jurassic strata diminish for around 10 km, leaving only the basal Lias Group rocks.

Source: Yorkshire Wolds Countryside Character Area Description

2.4 Superficial deposits

There is relatively little in the way of superficial deposits over much of the NCA. Till and glacial outwash are present in the Flamborough area and also along the western margin of the NCA, where a small area of coversands is present in the south.

Source: Yorkshire Wolds Countryside Character Area Description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	4
National	Mixed Interest SSSIs	4
Local	Local Geological Sites	0

Source: Natural England (2011)

**Local sites are non statutory designations*

- Details of individual Sites of Special Scientific Interest can be searched at: http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm

2.6 Soils and Agricultural Land Classification

Shallow lime-rich soils over chalk, cover 46 per cent of the NCA; while freely draining lime-rich loamy soils cover 29 per cent. These soil types allow easy cultivation and produce high grade agricultural land characteristic of the area and suitable for arable farming. The southern area on the coversands has poorer soils producing lower grade agricultural land.

Source: Natural England (2010)

The main grades of agricultural land in the NCA are broken down as follows (as a proportion of total land area).

Agricultural Land Classification	Area (ha)	Percentage of NCA
Grade 1	0	0
Grade 2	54,627	49
Grade 3	47,903	43
Grade 4	6,776	6
Grade 5	459	<1
Non-agricultural	735	<1
Urban	856	<1

Source: Natural England (2010)

- Maps showing locations of sites can be found at: http://magic.defra.gov.uk – select 'Landscape' (shows ALC and 27 types of soils).

3. Key waterbodies and catchments

3.1 Major rivers/canals

The following major rivers/canals (by length) have been identified in this NCA.

Name	Length in NCA (km)
Gypsey Race	23
Kelk Beck	3

Source: Natural England (2010)

Please note: other significant rivers (by volume) may also occur. These are not listed where the length within the NCA is short.

The NCA has no major rivers running through it though streams flow east to join the River Hull headwaters in the Holderness Plain and north and west to join the River Derwent. Indeed, these important headwaters begin in the Yorkshire Wolds. The permeable chalk produces many dry valleys and little surface water. Man-made dew ponds for watering livestock are characteristic of the area. Water resurfaces as springs and feeds chalk streams - the most northerly in Britain.

3.2 Water quality

The total area of nitrate vulnerable zone (NVZ) is 107,913 ha, 97 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

Maps are available from the Environment Agency showing current and projected future status of water bodies at:
http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 6,539 ha of woodland (6 per cent of the total area), of which 243 ha is ancient woodland.

Source: Natural England (2010)

4.2 Distribution and size of woodland and trees in the landscape

The NCA is sparsely wooded on the open Wolds with very few hedgerow trees. Scattered shelter belts and plantations often planted close to post enclosure farmsteads consist mostly of ash, beech, sycamore or larch. Distinct clusters of woodland occur on the foothills of the western scarp above Pocklington, around Londesborough Park and some other large estates. Along the northern escarpment, recent conifer plantations have been established. A handful of sites appear to have long continuity of woodland cover such as Millington Wood. Small but important pockets of wet woodland can be found alongside Gypsey Race. The western escarpment with its sandier soils has a higher proportion of woodland which includes birch, oak and planted Scots Pine. There has been significant new planting of small scattered woodland blocks on higher land and steeper slopes in the west and north, and woodlands with Woodland Grant Scheme management agreements have increased.

Source: Yorkshire Wolds Natural Area Profile (1997)

4.3 Woodland types

A statistical breakdown of the area and type of woodland found across the NCA is detailed below.

Area and proportion of different woodland types in the NCA (over 2 ha):

Woodland type	Area (ha)	Percentage of NCA
Broadleaved	4,462	4
Coniferous	1,390	1
Mixed	244	<1
Other	443	<1

Source: Forestry Commission (2012)

Area and proportion of ancient woodland and planted ancient woodland sites (PAWS) within the NCA:

Woodland type	Area (ha)	Percentage of NCA
Ancient semi-natural woodland	34	<1
Planted Ancient Woodland (PAWS)	210	<1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Hedges and hedgerow trees remain an important feature of the landscape, and in some places, they are low and tightly trimmed. Hedgerows planted as part of the Parliamentary enclosures border a pattern of straight, wide drove ways with wide verges.

Source: Yorkshire Wolds Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

A combination of hedges and fences enclose large, regular shaped fields dating back to Parliamentary enclosure. The open wolds consist of large, gently rolling arable fields whereas the western edge of the escarpment has smaller field patterns.

Source: Yorkshire Wolds Countryside Character Area description; Countryside Quality Counts (2003)

6. Agriculture

The following data has been taken from the Agricultural Census linked to this NCA.

6.1 Farm type

Holdings are predominantly arable with 274 cereal holdings (38 per cent) and 205 general cropping holdings (28 per cent). Between 2000 and 2009, numbers of cereal and general cropping holdings have decreased by 8 per cent and 12 per cent respectively.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Farm size is generally large, with over 60 per cent of farms above 50 ha, accounting for 95 per cent of the farmed land. There are only 62 holdings under 5 ha. Between 2000 and 2009, numbers of larger holdings (those over 100 ha and 50-100 ha have decreased by 14 per cent and 8 per cent respectively, while smaller holdings between 20-50 ha have increased by 19 per cent.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

In 2000 the total farmed area was 102,607 ha with 65,597 ha (63 per cent) farmed by the owner. By 2009 the total farmed area was 100,291 ha with 68,244 ha (68 per cent) farmed by the owner.

Source: Agricultural Census, Defra (2010)

6.4 Land use

55 per cent (55,555 ha) of the farmed area is used for cereal crops, while another 18 per cent (17,865 ha) is used for oilseeds, cash roots, stock feed and other arable crops. 18 per cent of the land is grass and uncropped land covering 18,262 ha of the farmed area; this has decreased since 2000 from 23,363 ha. Vegetables are grown on 4 per cent (4,428 ha) of the land; this has decreased from 5,000 ha in 2000.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

In 2009, there were 139,500 pigs (mainly indoor reared) which represents a reduction in numbers from 171,200 (19 per cent) in 2000. There are 51,700 sheep and 26,200 cattle, which between 2000 and 2009 have decreased in numbers from 92,900 (44 per cent) and 32,100 (18 per cent) respectively. These figures show a significant decrease in numbers of sheep livestock by 44 per cent over the 10 year period.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

In 2009, most holdings were managed by principal farmers (1,133), a decrease of 176 (13 per cent) since 2000. However, salaried managers have increased from 103 to 117 (14 per cent) over this 10 year period.

Source: Agricultural Census, Defra (2010)

Please note: (i) Some of the Census data are estimated by Defra so may not present a precise assessment of agriculture within this area (ii) Data refers to commercial holdings only (iii) Data includes land outside of the NCA where it belongs to holdings whose centre point is recorded as being within the NCA.

7. Key habitats and species

7.1 Habitat distribution/coverage

Chalk grassland, once predominant over much of the NCA, is reduced to 1 per cent of the land with main concentrations found in the karst valleys above Pocklington, around Thixendale and in the north-east. It comprises a mosaic of plant communities from tall, tussocky swards dominated by tor-grass to the short, herb-rich turf of well-grazed sheepwalks which support butterflies and moths such as the marbled white, brown argus and cistus forester.

Springs and flushes fed by calcareous groundwater occur in some of the valleys, on the scarp slopes and along the coastline supporting species such as marsh valerian, marsh marigold and sedges. These springs are sometimes the source of chalk streams supporting distinctive invertebrate communities while constantly-flowing streams support water-crowfoot beds as they descend into the surrounding plains. Some, such as the Gypsey Race running east towards Bridlington, have seasonal flows and are known as winterbournes.

A few flushes also appear on the coastal strip, a good example being Hoddy Cows Spring SSSI near Speeton. Here water rises through boulder clay from the underlying chalk aquifer; a rich flush flora features bog pimpernel, bogbean and butterwort. Flushes on the Flamborough Headland are of significant botanical interest. The NCA contains Britain's most northerly chalk streams including the headwaters of the River Hull which flow from the chalk above Driffield into the Holderness plain, and Settrington Beck which descends the northern scarp into the Vale of Pickering to join the River Derwent. Beds of stream water- crowfoot are the most characteristic vegetation of the constantly-flowing reaches of these watercourses with lesser water parsnip, water-cress and water starworts where the flow slackens. The headwaters also support populations of water voles.

The NCA is sparsely wooded but there are a small number of calcareous ash woods of nature conservation importance such as Millington Wood which supports a rich ancient woodland flora. The nationally scarce baneberry grows at this and a handful of other sites.

Arable farmland supports important species of farmland birds such as grey partridge, lapwing, turtle dove, yellow wagtail, tree sparrow corn bunting, quail, barn owl and yellowhammer.

Source: Yorkshire Wolds Natural Area Profile

Calcareous grasslands support a mosaic of calcicolous plants, butterflies and moths such as the marbled white butterfly shown here.

7.2 Priority habitats

The Government's new strategy for biodiversity in England, Biodiversity 2020, replaces the previous Biodiversity Action Plan (BAP) led approach. Priority habitats and species are identified in Biodiversity 2020, but references to BAP priority habitats and species, and previous national targets have been removed. Biodiversity Action Plans remain a useful source of guidance and information. More information about Biodiversity 2020 can be found at; www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/englandsbiodiversitystrategy2011.aspx.

The NCA contains the following areas of Biodiversity Action Plan (BAP) mapped priority habitats (as mapped by National Inventories). Footnotes denote local/expert interpretation. This will be used to inform future National Inventory updates.

Priority habitat	Area (ha)	Percentage of NCA
Broad-leaved mixed & yew woodland (broad habitat)	2,122	2
Lowland calcareous grassland	1,073	1
Lowland meadows	194	<1
Lowland dry acid grassland	113	<1
Fens	96	<1
Reedbeds	96	<1
Maritime cliff and slope	84	<1
Purple moor grass and rush pasture	6	<1
Mudflats	1	<1

Source: Natural England (2011)

- Maps showing locations of priority habitats are available at: http://magic.defra.gov.uk – Select 'Habitats and Species/Habitats'

7.3 Key species and assemblages of species

- Maps showing locations of some key species are available at: http://magic.defra.gov.uk – Select 'Habitats and Species/Habitats'
- Maps showing locations of S41 species are available at http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

Relatively sparsely populated with villages located few and far between, often nestled in valleys or hollows. There is a very distinct line of small villages along the Great Wold Valley following the spring line. A cluster of development occurs west of Wetwang, along the axis of the A166 with expansion along the A63 corridor and around existing large settlements.

Source: Yorkshire Wolds Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The NCA has low levels of dispersed settlement, dominated by nucleated villages and small towns, some of which follow key valleys. The largest settlements lie close to the border of the NCA being, Market Weighton, Bridlington and Driffield. The total estimated population for this NCA (derived from ONS 2001 census data) is, 53,706.

Source: Yorkshire Wolds Countryside Character Area description; Countryside Quality Counts (2003)

8.3 Local vernacular and building materials

Traditional buildings, mostly dating from mid 18th century, are brick, with limestone to the west and chalk near Flamborough Head. Along the scarp, foot buildings are predominantly stone-built with a vernacular based on limestone with red brick detailing and red pan tiles.

Source:Yorkshire Wolds Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

Extensive evidence for Neolithic / bronze-age / Romano-British settlement, including long and round barrows, and evidence from crop marks, especially to western fringe, in the Great Wold Valley and around Rudston. High proportion of enclosure by parliamentary act between mid 18th century and 1815. Remnants of medieval settlements, notable examples being Wharram Percy and Thixendale Park. Establishment of parks marked from 16th century (Sledmere House, Dalton Hall, Londesborough Park, Houghton Hall, Scampston Hall and Risby Hall). Churches and chapels of all periods, this area having the greatest concentration of Methodist chapels outside Cornwall and a fine group of Victorian churches (by JL Pearson and Temple Moore) built on the Sledmere estate.

Source: Countryside Quality Counts Draft Historic Profile, Countryside Character Area description

9.2 Designated historic assets

This NCA contains the following numbers of designated heritage assets:

- 6 Registered Parks and Gardens covering 934 ha.
- 0 Registered Battlefields covering 0 ha.
- 428 Scheduled Monuments.
- 717 Listed Buildings.

Source: Natural England (2010)

- More information is available at the following address: http://www.english-heritage.org.uk/caring/heritage-at-risk/

  http://www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/

10. Recreation and access

10.1 Public access

- 2 per cent of the NCA 1,958 ha is classified as being publically accessible.
- There are 591 km of Public Rights of Way at a density of 0.5 km per km2.
- There are 117 km of National Trail (Yorkshire Wolds Way National Trail) within the Yorkshire Wolds NCA.

Sources: Natural England (2010)

The following table shows the breakdown of land which is publically accessible in perpetuity:

Access designation	Area (ha)	Percentage of NCA
National Trust (Accessible all year)	0	0
Common Land	2	<1
Country Parks	0	0
CROW Access Land (Section 4 and 16)	1,566	1
CROW Section 15	16	<1
Village Greens	9	<1
Doorstep Greens	0	0
Forestry Commission Walkers Welcome Grants	2	<1
Local Nature Reserves (LNRs)	198	<1
Millennium Greens	0	0
Accessible National Nature Reserves (NNRs)	0	0
Agri-environment Scheme Access	71	<1
Woods for People	90	<1

Sources: Natural England (2011)

Please note: Common Land refers to land included in the 1965 commons register; CROW = Countryside and Rights of Way Act 2000; OC and RCL = Open Country and Registered Common Land.

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of tranquillity (2006) a large proportion of the NCA has a strong sense of tranquillity due to its elevated views, lack of visual intrusion and sparse settlement patterns including lack of large cities and towns. Tranquillity is reduced along the A166 and A165, and in the south near Hull and other settlements on the Humber Estuary.

A breakdown of tranquillity values for this NCA are detailed in the table below:

Tranquillity	Score
Highest value within NCA	45
Lowest value within NCA	-50
Mean value within NCA	12

Sources: CPRE (2006)

- More information is available at the following address: www.cpre.org.uk/resources/countryside/tranquil-places

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that a large proportion of the NCA (78 per cent) remains undisturbed.

A breakdown of intrusion values for this NCA are detailed in the table below.

intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	3	14	21	17
Undisturbed	96	85	78	-18
Urban	n/a	n/a	1	1

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are a small increase in urbanisation and disturbed land. However a high proportion of the NCA remains largely undisturbed.

- More information is available at the following address: www.cpre.org.uk/resources/countryside/tranquil-places

12. Data sources

- British Geological Survey (2006)
- Natural Area Profiles, Natural England (published by English Nature 1993-1998)
- Countryside Character Descriptions, Natural England (regional volumes published by Countryside Commission/Countryside Agency 1998/1999)
- Joint Character Area GIS boundaries, Natural England (data created 2001)
- National Parks and AONBs GIS boundaries, Natural England (2006)
- Heritage Coast Boundaries, Natural England (2006)
- Agricultural Census June Survey, Defra (2000,2009)
- National Inventory of Woodland & Trees, Forestry Commission (2003)
- Countryside Quality Counts Draft Historic Profiles, English Heritage (2004)*
- Ancient Woodland Inventory, Natural England (2003)
- BAP Priority Habitats GIS data, Natural England (March 2011)
- Special Areas of Conservation data, Natural England (data accessed in March 2011)
- Special Protection Areas data, Natural England (data accessed in March 2011)
- Ramsar sites data, Natural England (data accessed in March 2011)
- Sites of Special Scientific Interest, Natural England (data accessed in March 2011)
- Detailed River Network, Environment Agency (2008)
- Source protection zones, Environment Agency (2005)
- Registered Common Land GIS data, Natural England (2004)
- Open Country GIS data, Natural England (2004)
- Public Rights of Way Density, Defra (2011)
- National Trails, Natural England (2006)
- National Tranquillity Mapping data, CPRE (2007)
- Intrusion map data, CPRE (2007)
- Registered Battlefields, English Heritage (2005)
- Record of Scheduled Monuments, English Heritage (2006)
- Registered Parks and Gardens, English Heritage (2006)
- World Heritage Sites, English Heritage (2006)
- Incorporates Historic Landscape Characterisation and work for preliminary Historic Farmstead Character Statements (English Heritage/Countryside Agency 2006)

Please note all figures contained within the report have been rounded to the nearest unit. For this reason proportion figures will not (in all) cases add up to 100%.
The convention <1 has been used to denote values less than a whole unit.

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- There has been new planting of small scattered woodland blocks on higher land and steeper slopes in the west and north.
- There has been an increase in the area of woodlands managed under Woodland Grant Scheme agreements.

Boundary features

- Countryside Stewardship agreements for linear features between 1999-2003 targeted hedge planting and restoration.
- The total length of agreements between 1999 and 2003 was equivalent to about 4 per cent of field boundaries within the NCA.
- Recent data from March 2011 shows a dramatic increase of 1,862 km of boundary features under Environmental Stewardship options, mainly through the Entry Level Scheme, resulting in tightly cropped hedges filling out and becoming taller and wider.

Agriculture

- Overall, during the period 2000 to 2009 there has been little change. However, during that period, holdings producing oilseed more than doubled, there has been a decrease in pig, sheep and cattle numbers by 19 per cent, 44 per cent and 18 per cent respectively and while the number of principal farmers remain unchanged, the employment of full time workers fell by 36 per cent.

Settlement and development

- There is a cluster of development west of Wetwang along the axis of the A166, expansion along the A63 corridor and around existing larger settlements, and an increase in applications for wind farm sites.

Semi-natural habitat

- Semi-natural habitats are limited in extent within this NCA. Less than 1 per cent is nationally designated for nature conservation. 27 per cent of the SSSI are in favourable condition and 67 per cent are in unfavourable recovering condition.
- Countryside Stewardship agreements in 2003 for management of calcareous grassland covered 1 per cent of the NCA.
- More recently, through the Higher Level Environmental Stewardship Scheme, 722 ha of chalk grassland and 950 ha of all grassland are in conservation management.

Historic features

- In 1918 approximately 3 per cent of the NCA was historic parkland but by 1995 it was estimated that 37 per cent had been lost. About 28 per cent of the remaining parkland is covered by a Historic Parkland Grant, and 24 per cent is included in environmental stewardship schemes. About 68 per cent of historic farm buildings remain unconverted and 92 per cent are structurally intact.

Rivers

- Rivers and streams are few on the permeable chalk, being limited to a number of short streams draining steep valleys along the escarpment, and the Gypsey Race, which runs through the Great Wolds Valley. However, the chemical status and trends for groundwater is poor due to long term nitrate pollution of the aquifer including the River Hull headwaters SSSI in the adjoining NCA.

Minerals

- The Yorkshire and Humber Aggregate Mineral Resources map shows a number of active chalk quarries that may potentially result in extension of quarrying in the future.

Drivers of change

Climate change

- Climate trends suggest increased rainfall, periods of drought, and more frequent storm events.

- Increased summer droughts could result in demands on groundwater resources associated with the underlying chalk aquifer. Low groundwater levels inside the NCA are likely to result in lower river levels outside this NCA as they are spring-fed.

- Increased demands on agricultural land for food production in relation to food security.

- Potential introduction of new crops and longer cropping seasons potentially leading to double cropping.

- Possible impacts on semi-natural habitats, in particular on chalk grasslands, and on species through drought conditions including dominance of drought-resistant species.

Other key drivers

- The need for food security will result in continued agricultural production along with changing farming practices. Agri-environment schemes provide opportunities to work with land managers to incorporate farmland habitats, develop networks of linked habitats and enhance the rural character of the landscape.

- Continued demand for housing provision and associated growth, particularly along the A63 and railway transport route and west of Hull, but provide opportunities to respect local vernacular of traditional buildings.

- A policy of 'No Active Intervention' has been recommended in the draft Shoreline Management Plan for Flamborough Head, to allow the natural retreat of the cliff line enabling internationally designated sites to evolve under natural processes. It is recognised that there will be a need to plan for setting back properties after 2025.

- Promotion of careful development will be required concerning mineral/ aggregates extraction in order to protect the underlying chalk bedrock, but opportunities for biodiversity enhancement through restoration schemes from minerals planning should also be sought.

- There is a continuing demand for wind farm sites, and pressure to extend chalk quarries.

- The Marine and Coastal Access Act 2009 provides opportunities to protect the marine environment and ensure access to all parts of the coast. The coastal access trail will be created by working in close partnership with landowners in the long term.

- The chemical and quantitative trends for groundwater are poor suggesting that the chalk aquifer suffers from pollution and over-abstraction, potentially affecting water supply in the long term.

- The Humber River Basin management plan indicates that the water bodies within the NCA are generally poor and moderate, while ecological status of estuarine and coastal waters is good to moderate and chemical status of coastal waters is good.

Supporting document 3: Analysis supporting Statements of Environmental Opportunity

The following analysis section focuses on a selection of the key provisioning, regulating and cultural ecosystem goods and services for this NCA. These are underpinned by supporting services such as photosynthesis, nutrient cycling, soil formation and evapo-transpiration. Supporting services perform an essential role in ensuring the availability of all ecosystem services.

Biodiversity and geodiversity are crucial in supporting the full range of ecosystem services provided by this landscape. Wildlife and geologically-rich landscapes are also of cultural value and are included in this section of the analysis. This analysis shows the projected impact of Statements of Environmental Opportunity on the value of nominated ecosystem services within this landscape.

Planting semi-natural, chalk grasslands can help retain and purify water supplied by the underlying, chalk aquifer.

Statement of Environmental Opportunity	Ecosystem Service: Food provision	Timber provision	Biomass energy	Water availability	Genetic diversity	Climate regulation	Regulating soil erosion	Regulating soil quality	Regulating water quality	Regulating water flow	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Enhance, extend and manage the unique assemblage of chalk-based habitats (lowland chalk grasslands, streams), broadleaved woodland and maritime cliffs while protecting the provision and quality of water.	↗ **	↗ **	↔ **	↑ **	↗ **	↗ **	↑ **	↑ **	↑ **	↗ **	↗ **	o	↔ **	↑ **	↔ **	↑ **	↗ **	↑ ***	↗ **
SEO 2: Manage the coastal landscape of Flamborough Head with its diversity of cliffs, geology, geomorphology and habitats (including important seabird colonies), and enhance people's enjoyment of it through increased opportunities for recreation and education.	↔ **	↔ **	↔ ***	↔ **	↗ **	↔ **	↗ **	↗ **	↔ **	↔ *	↗ ***	o	↗ **	↑ ***	↗ **	↗ **	↑ ***	↑ ***	↗ **

Note: Arrows shown in the table above indicate anticipated effect on service delivery: ↑ = Increase ↗ = Slight Increase ↔ = No change ↘ = Slight Decrease ↓ = Decrease. Asterisks denote confidence in projection (*low **medium***high) o symbol denotes where insufficient information on the likely effect is available.

Dark plum = national importance; mid plum = regional importance; light plum = local importance

Statement of Environmental Opportunity	Ecosystem Service																		
	Food provision	Timber provision	Biomass energy	Water availability	Genetic diversity	Climate regulation	Regulating soil erosion	Regulating soil quality	Regulating water quality	Regulating water flow	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Improve opportunities to enhance people's enjoyment of the area while protecting high levels of tranquillity by conserving extensive views and intimate, steep-sided valleys which contribute to sense of place, and by protecting and promoting the extensive historic evidence of past human settlement, landscape change and designed landscapes.	↔ **	↔ **	↔ **	↔ ***	↔ ***	↔ **	↔ **	↔ **	↔ ***	↔ ***	↔ **	o	↔ ***	↑ ***	↑ ***	↑ ***	↑ ***	↗ **	↔ **
SEO 4: Maintain a sustainable but productive arable landscape, while expanding and connecting semi-natural habitats to benefit biodiversity, and soil and water quality by promoting good agricultural practice; extending grasslands along field margins and slopes, implementing extensive grazing regimes and ensuring compliance with regulations on nitrate vulnerable zones to manage fertiliser inputs.	↗ **	↔ ***	↔ ***	↗ **	↗ **	↗ **	↗ **	↗ **	↑ **	↗ **	↗ **	o	↔ ***	↑ ***	↔ **	↗ **	↗ **	↑ ***	↗ **

Note: Arrows shown in the table above indicate anticipated effect on service delivery: ↑ = Increase ↗ = Slight Increase ↔ = No change ↘ = Slight Decrease ↓ = Decrease. Asterisks denote confidence in projection (*low **medium***high) o symbol denotes where insufficient information on the likely effect is available.

Dark plum = national importance; mid plum = regional importance; light plum = local importance

Landscape attributes

Landscape attribute	Justification for selection
A large-scale, expansive rolling chalk landscape, with a plateau extending eastwards towards the North Sea and the high chalk cliffs of Bempton and Flamborough Head, with deeply incised valleys.	■ Expansive, open views with big skies from the escarpment and plateau provide a sense of openness, contrasted against the more enclosed, sheltered valleys which divide them and instil a sense of intimacy. ■ The absence of people in this lightly settled landscape provides low intrusion and a high level of tranquillity. ■ The development of recreation opportunities for different users through the main walking and cycling routes; the Yorkshire Wolds Way National Trail, a long distance route running from Hessle near Hull to Filey Brigg, the Transpennine Trail passing through the southern tip, the Way of the Roses cycle route, running 'coast to coast' from Morecambe Bay to Bridlington Bay and a circular route running from Beverley to Market Weighton known as the Yorkshire Wolds Cycle Route. Additionally, bridleways and a number of easy access and circular walks. ■ The dramatic, hard, chalk coastline of Flamborough Head and Bempton Cliffs are designated Heritage Coast due to their natural, cultural and geological interest. The good coastal paths provide access and recreation for local communities and visitors. Expansion of the coastal path northwards to join the Cleveland Way - in the Vale of Pickering NCA- is recognised as a potential opportunity. ■ Flamborough Head is designated a European Marine Site comprising a Special Area of Conservation (SAC) for chalk reef and sea caves and a Special Protection Area (SPA) for breeding sea birds.
Long history of human occupation, settlement and land use throughout the Wolds from the early Neolithic to today in the form of buried archaeology, upstanding earthworks, buildings and designed landscapes.	■ Remains of burial mounds indicate Neolithic settlers, prehistoric earthworks with bronze and iron age sites such those in the Great Wold Valley and around Rudslon. ■ Recurrent periods of settlement in Roman, Saxon, Danish and Norman times. ■ Remnants of medieval settlements on the open hills such as Wharram Percy and Swaythorpe Croom. ■ Extensive evidence of past human impact on the Wolds landscape, well illustrated in crop and soil mark sites seen from aerial photography and geophysical survey.

Landscape attribute	Justification for selection
Lightly settled landscape with settlement patterns established mainly around the fringes and along spring lines to the west and east.	■ Long-established villages nestled in valleys with village ponds being a common characteristic. ■ Villages with brick and pan tiled-roof buildings are notable features but limestone sometimes used in the west. Near Flamborough Head, older buildings are built with chalk. ■ Sparsely populated with the largest towns of Market Weighton, Bridlington, Pocklington, Driffield and Norton on Derwent situated outside the NCA but close to its boundaries. ■ A cluster of development occurs west of Wetwang, along the axis of the A166 with expansion along the A63 corridor.
Underlying Upper Cretaceous Chalk of the Wolds comprises the most northerly formation in Britain. Earlier Jurassic rocks bind the base along northern and western escarpments.	■ Connection between underlying chalk of the Wolds hills and land use. Fertile, chalky soils have resulted in the dominance of arable farming. ■ Jurassic and Cretaceous sedimentary strata exposed by quarrying and of which 5 Sites of Special Scientific Interest have been notified wholly or partly for their earth science importance. ■ Underlying chalk aquifer is a valuable groundwater source but vulnerable to summer water scarcity. The western edge (Yorkshire Derwent) and eastern part of the NCA (East Riding of Yorkshire/North Lincolnshire) are identified as catchment sensitive farming priorities.
An open landscape, sparsely-wooded except for scattered shelterbelts associated with farmsteads and small number of ancient woodlands.	■ High on the Wolds plateau, limited woodland cover and lack of vertical structures, contributes to the sense of openness and escapism, while shelterbelts appear as features on the skyline close to farmsteads. ■ A small number of woodlands in the north of the Wolds have conservation value supporting ancient woodland flora such as bluebell and wood sorrel, while in the south, calcareous ash woodlands such as Millington Wood, contain the nationally scarce baneberry and redstart is a localised breeding bird.

Landscape attribute	Justification for selection
Large, planned arable fields dating from the 18th century characterise much of the landscape.	■ Large field sizes, with sparse hedgerows are the result of intensive cultivation due to the importance of arable farming, mainly cereal production and oil seeds. ■ Prominent, historic features of land use are the straight drove ways that cross the fields and enclosure roads with wide verges. ■ Arable farmland is important for a number of declining species in the NCA mainly corn bunting, grey partridge and hare.
Valuable habitats of chalk grassland, calcareous streams, spring-fed flushes, chalk rivers and calcareous ash woodlands.	■ Unimproved or semi-improved calcareous grassland on steep-sided dry valleys are a key characteristic occurring throughout the NCA but with concentrations above Pocklington (Millington) and around Thixendale and Forden in the north eastern area. ■ Calcareous grasslands are an important BAP habitat covering only 1.3 per cent of the NCA and of which there are 20 Sites of Special Scientific Interest (SSSI). They support a mosaic of plant communities such as tor-grass and characteristic grassland herbs such as dropwort and lady's bedstraw. Species supported are butterflies and moths including the marbled white, brown argus and cistus forester. ■ Some remaining chalk grasslands have deteriorated due to adverse grazing regimes, reduction in stock numbers, piecemeal improvements, and encroachment of coarse grasses. ■ Disused chalk quarries provide opportunities for habitat creation, restoration or maintenance. ■ Spring-fed flushes fed by calcareous groundwater occur in several valleys and give rise to calcareous marsh plant communities, along the scarp slopes and coastline such as Hoddy Cows Spring SSSI near Buckton where water rises through boulder clay from the underlying chalk aquifer, consisting of species-rich fen and mosses. ■ Coastal spring flushes contain important plant communities and are of significant botanical interest on the Flamborough Headland. ■ Calcareous streams, the most northerly in Britain, are found along the western escarpment, and along the east side streams supporting distinctive invertebrates flow into the River Hull SSSI in the adjoining Holderness NCA. ■ Chalk rivers provide important hydrology within the otherwise dry valleys and support white-clawed crayfish. ■ South of the Wolds a small number of calcareous, ash woodlands support ancient woodland flora.

Landscape opportunities

- Protect expansive views of rolling hills and dramatic, heritage coastline for remoteness, tranquillity, geology and recreation.
- Conserve archaeological evidence and ground features such as burial mounds, earthworks, settlement sites, barrows and crop marks.
- Conserve important nesting sites for cliff-breeding birds notably the black-legged kittiwake at Flamborough and Bempton.
- Protect access to cliffs for the benefit of sea birds and enhancement of recreation opportunities.
- Protect unity of building materials related to local geology.
- Conserve existing calcareous ash woodlands through sound conservation management.
- Protect archaeological ground features and historical features, including drove ways and enclosure roads with wide verges.
- Protect, manage, enhance and restore species-rich swards of unimproved/semi-improved chalk grasslands by suitable grazing and management of scrub to retain diversity of flora and fauna.
- Manage disused, chalk quarries for their biodiversity value including seeking opportunities for habitat creation and restoration through minerals planning.
- Manage calcareous ash woodlands by maintaining diverse woodland structure including coppicing and create new riparian woodland along watercourses and wider catchment planting on the lower eastern slopes of the Wolds.
- Manage rivers, streams and flushes to maintain hydrological processes and enhance the biodiversity of important plant and invertebrate communities and the white-clawed crayfish found in chalk rivers.
- Maintain quantity and quality of groundwater avoiding contamination by fertilisers and feeding of livestock by promoting good agricultural practices and through the environmental stewardship scheme.
- Avoid impacting on sense of remoteness and obstruction of clear views.
- Work with Local Access Forums to manage and maintain the existing public rights of way network.
- Interpret the surviving historic evidence from all periods and its relationship with the landscape.
- Manage and enhance the conservation of the finite archaeological and historical resource through supporting land managers and local communities and identifying education, access and research opportunities.
- Encourage land management interventions to provide food and shelter for farmland birds such as corn bunting, grey partridge, yellow wagtail and turtle dove.
- Plan new building to be sympathetic to local styles and materials.
- Ensure adequate, clean groundwater supply of chalk aquifer and hydrology of NCA.
- Support developments that are sensitive to protecting the expansive views of the Wolds.
- Create better access and recreation opportunities by providing more links from villages to the Yorkshire Wolds Way and the Transpennine Trail via permissive paths, bridleways and cycle routes.
- Work in partnership to explore opportunities to extend coastal access linking to Filey, which joins the Cleveland Way in the Vale of Pickering NCA.

Ecosystem service analysis

The following section shows the analysis used to determine key ecosystem service opportunities within the area. These opportunities have been combined with the analysis of landscape opportunities to create Statements of Environmental Opportunity.

Please note that the following analysis is based upon available data and current understanding of ecosystem services. It does not represent a comprehensive local assessment. Quality and quantity of data for each service is variable locally and many of the services listed are not yet fully researched or understood. Therefore the analysis and opportunities may change upon publication of further evidence and better understanding of the inter-relationship between services at a local level.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Livestock systems Cereal and oilseed Production	High percentage of Grade 2 and 3 agricultural land - dominated by arable production and livestock production (mainly pigs).	National	Food provision is a significant service in the Wolds but intensive cultivation of land may also lead to loss of water quality due to nitrate inputs. Extensive arable land and limited semi-natural habitats reduces the range of nectar sources for pollinating insects. Soil regulation may be reduced if more land is cultivated and if it replaces semi-natural habitats such as species-rich grassland.	Encourage sustainable farming practices including compliance with nitrate vulnerable zone (NVZ) regulations.	**Food provision** **Biodiversity** **Climate regulation** **Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Water availability**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Existing woodland	There is 6 per cent woodland cover with limited commerical timber produced, apart from that from the larger estates such as Sledmere.	Local	Although woodland cover is low, there are limited opportunities for further woodland creation because of the potential impact on productive agricultural land, open landscape and expansive views.	Opportunities for commercial timber production are limited because land is more suited to agriculture. Small woodland blocks could be created on higher land and steeper slopes in the west and conifer plantations to the north. Much of the broadleaved woodland is of high nature conservation value and should be protected and maintained.	**Climate regulation** **Regulating soil erosion** **Regulating water quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Existing woodland	Limited woodland cover limits availability of existing woody biomass.	Local	Improved woodland management could provide a local source of fire wood and woodchip. There are limited locations for new biomass plantings. The area offers medium potential yields for short rotation coppice (SRC) and miscanthus. For information on the potential landscape impacts of biomass plantings within the NCA, refer to http://archive.defra.gov.uk/foodfarm/growing/crops/industrial/energy/opportunities/index.htm	Ensure existing woodlands are managed to produce surplus timber that could be used to provide local sources of biomass.	**Biomass energy** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Chalk aquifer Semi-natural chalk grasslands	Water is rarely found on the land surface but the chalk substrate forms a major aquifer supplying water to the Yorkshire and Humber region and some limited irrigation for agriculture. There are no major rivers running through the NCA but streams and calcareous springs flow east feeding into the upper reaches of the River Hull Headwaters SSSI in the adjoining Holderness NCA	Regional	There is little surplus water available, with the eastern coastal part of the aquifer considered to be over-licensed potentially creating a risk to the base flows in some rivers and streams in the west of the Character Area. An increase in abstraction used for drinking water supplied to the region is likely to affect water availability in drought conditions. Protecting streams and calcareous springs in this otherwise dry NCA, is essential for biodiversity and flows of the River Hull Headwaters in the adjoining Holderness NCA.	Maintaining and improving the chalk aquifer for public water supply, its long term resilience and water storage by working with the local farming community to adopt sustainable farming practices such as; compliance with NVZ regulations, creating or restoring grasslands on the valley slopes to improve filtration into the ground and reduce nutrient run-off and creation of grass buffer strips close to springs and chalk streams.	**Water availability** **Regulating water quality** **Food provision** **Biodiversity** **Regulating soil quality**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity -not commercially important in this NCA						
Climate regulation	Woodland Semi-natural habitats	The majority of the NCA has a low carbon soil content (0-5 per cent), rising only to 5-10 per cent in a few patches in the west. These relatively thin chalk soils have low levels of organic matter and high use of fertilisers, necessary for arable production.	Local	Soil cultivation involving high fertiliser use for arable production as well as livestock grazing (cattle), are likely to be a significant source of the greenhouse gas, nitrous oxide. The low woodland cover (4.5 per cent) contributes little to carbon storage.	Encourage sustainable cultivation practices such as green cover crops to reduce nitrate leaching, and extensive grazing regimes (cattle) to reduce methane production. Encourage reduced fertiliser inputs on cultivated soils by ensuring Government guidelines (NVZ regulations) are followed by farmers and land managers. Encourage management of hedges and hedgerow trees; filling in gaps and allowing them to fill out. Encourage woodland creation within valleys or as shelterbelts around farmsteads where appropriate.	**Climate regulation** **Timber provision** **Regulating soil erosion** **Regulating soil quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Sustainable farming practices Semi-natural habitats	The thin, chalky tills of the NCA are resilient to soil erosion.	Regional	The most vulnerable areas regarding soil erosion are on the steep valley slopes under arable production, particularly during frequent, high intensity downpours at a time when crops are establishing or being harvested.	Encourage efforts to increase green cover crops or establish permanent grassland on steep slopes. Create grasslands on slopes, and grassland buffer strips along field margins and alongside watercourses, especially on the lower slopes on the east side of the Wolds. Encourage extensive grazing regimes on soils most vulnerable to compaction.	**Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Water availability** **Climate regulation** **Biodiversity** **Sense of place/ inspiration**
Regulating soil quality	Soils Sustainable farming practices Semi-natural chalk grasslands Geological processes	45 per cent of the area is covered by shallow lime-rich soils, while 29 per cent are freely draining lime-rich loamy soils. These soil types are typically shallow and free-draining. Although they are vulnerable to drought, they also have a degree of natural resilience due to their calcareous nature. These soils are valuable for aquifer recharge.	Regional	Organic matter may be lost through frequent tillage associated with arable farming, however, cultivation of some arable crops such as potatoes can help retain organic matter.	Encourage sustainable farming practices; test soils to assess nutrient needs and encourage expansion of permanent grasslands and green cover crops to build up organic matter.	**Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Water availability** **Biodiversity** **Sense of place/ inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Chalk aquifer Semi-natural habitats	The chemical quality of groundwaters (including the chalk aquifer) is classified as poor throughout the NCA. Where the water table is sufficiently high to permit river flows, surface water is of moderate ecological quality. 97 per cent of the area is a Nitrate Vulnerable Zone There are indications that water quality downstream is being affected by activities in this NCA.	Regional	Diffuse agricultural pollution through nitrates is likely to affect water quality of the groundwaters and the fragile northerly chalk streams of the NCA, as well as waterways in adjoining NCAs into which the streams feed. Areas covered by semi-natural habitat in good ecological condition are generally less susceptible to high rates of run-off.	Reduce diffuse pollution by encouraging sustainable farming practices; avoiding overuse of fertilisers and pesticides (adhering to NVZ guidelines), and encouraging the creation of grasslands on valley slopes. Seek opportunities for wider catchment woodland planting on the lower eastern slopes to help promote rainfall infiltration into the soil reduce water pollution and sediment run-off, creating grassland buffer strips or riparian woodland along watercourses.	**Regulating water quality** **Regulating soil erosion and quality** **Biodiversity** **Sense of place/ inspiration** **Timber provision**
Regulating water flow	Chalk aquifer	The permeable nature of the underlying Chalk ensures that there are no large areas at risk from river flooding.	Local	Flooding is not an issue in the NCA.		**Regulating water flow**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion and flooding	Chalk cliffs	The narrow stretch of coast around Flamborough Head stands well above sea level and is not at risk of coastal flooding, although some erosion is occurring at a slow rate.	Local	No Active Intervention has been recommended in the draft Shoreline Management Plan for Flamborough Head. There is an intention to allow the natural retreat of the cliff line, enabling internationally designated sites to evolve under natural processes[4].	Allow natural coastal processes to continue	**Regulating coastal erosion and flooding**
Pollination	Semi natural chalk grasslands Semi-natural woodlands Pollinating insects	Dominance of arable cultivation limits habitat for pollinating insects. Current semi-natural, non-wooded habitats cover only 2 per cent of the NCA.	Local	Pollination of oilseed crops is essential for sustainable agricultural production, but monoculture of crops for arable farming and lack of semi-natural habitats provides less variety of plant species for pollinating insects. Semi-natural woodlands can also be a source of nectar, particularly early in the season.	Encourage sustainable farming practices; increase species-rich grasslands and plant nectar-rich seed mixes to create an ecological network of habitats. Extend the network of woodlands where appropriate.	**Food production** **Pollination** **Biodiversity**

[4] The Seascape character area assessment for the East Inshore and East Offshore marine plan area can be seen here: www.gov.uk/government/publications/east-marine-plan-areas-seascapecharacter-assessment

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	Long views of rolling hills and big skies Contrasting with enclosed steep-sided valleys Low tree cover Sheep-grazed unimproved or semi-improved calcareous grassland in steep-sided dry valleys and hillsides of floristically-rich grasslands Sparse settlement patterns Rugged coastline Time depth of evident historic interest	Open, undulating, simple, uniform, a much valued landscape that provides inspiration for creativity such as is seen in the work of landscape artist, David Hockney. An area characterised by its gently rolling hills and un-commercial nature, which is contrasted against the neighbouring flat land towards Hull. Dramatic steep chalk cliffs at the coast captured in the 120-meter high Flamborough Head and its high, open, long distant views. Views of expansive skies over a large-scale landscape. The openness and perceived closeness to the sky makes people feel they have transcended their day-to-day lives. There is a wide range of historic features from prehistory through medieval times to historic parklands.	Regional	Continuity of long views and rolling hills provides a sense of openness and a landscape that has remained largely unchanged for many years. This is likely to have a strong effect on local identity. The lack of manmade structures in this lightly settled landscape creates a sense of escapism from the modern world. By contrast to the top of the Wolds, the hidden, steep-sided valleys that divide the hills give a sense of intimacy and remoteness. In the east, the underlying chalk reaches the North Sea forming a rugged coastline at Bempton and Flamborough Head where large colonies of breeding seabirds are iconic to the area providing an interesting wildlife spectacle for local people and visitors.	Ensure that development respects local settlement patterns, building materials, expansive viewpoints, enclosed, steep-sided valleys, wildlife, geology and historic evidence. Encourage visitors to the NCA. Offer good quality interpretation at key sites and encourage opportunities for education of the natural environment (landscape, biodiversity, wildlife, geology and heritage) by working with schools and other educational institutions.	**Sense of place/ inspiration** **Recreation** **Sense of history** **Tranquillity** **Biodiversity** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Prehistoric monuments, landscape features, and settlements, later settlement patterns and post-medieval landscape change Deserted medieval villages on open hills Estates and parklands	Rich, prehistoric remains and numerous bronze and iron-age monuments, especially in Great Wold Valley. Deserted medieval settlements on the open hills; large estates and parklands (six registered parks and gardens). Strong unifying local vernacular linked to the underlying geology, including limestone, chalk and red brick.	Regional	This area has a rich and varied history resulting in a range of structures and features providing opportunities for tourism and education. There is also a need for its protection as some features may be damaged by deep ploughing of land.	Protect historic features by encouraging best agricultural practices such as through reversion of arable to grassland where land management threatens the integrity of earthworks and below-ground archaeology, encouraging scrub removal on earthworks (Neolithic, bronze- and iron-age monuments). Develop a package of interpretation through partnership on key sites for visitors, school children and students. Develop a package of visitor/ tourism opportunities. Ensure developers respect the local vernacular regarding new buildings. Maintain estates and parklands and protect ancient monuments at risk identifying opportunities through Environmental Stewardship.	**Sense of history** **Sense of place/ inspiration** **Recreation** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquility	Expansive, open views and enclosed steep-sided valleys Sparse settlement patterns and low population Long, distant sea views from coastline	An area with a strong sense of tranquillity. In 2007, 78 per cent of the NCA was classified as undisturbed (CPRE Intrusion Map).	Regional	A very large proportion of the NCA contributes to the high sense of tranquillity due to elevated views, low proportion of manmade structures, sparse settlement patterns and lack of major towns and cities.	Encourage sensitive development respecting open and expansive viewpoints and strong rural character of the area.	**Tranquillity** **Sense of history** **Sense of place/ inspiration** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Network of Footpaths Yorkshire Wolds Way Transpennine Trail Heritage Coast Large estates and Parklands Historic sites National Cycle Routes	2.5 per cent of the area is open access land, along with 682 km of rights of way at a density of 0.5 km per km^2. Main routes include a small section of the Transpennine Trail and the Yorkshire Wolds Way National Trail, the latter covering 117 km. There are a number of circular routes linking to them. There are two national cycle routes; The Way of the Roses, running coast to coast from Morecambe Bay to Bridlington Bay and a circular route known as the Yorkshire Wolds Cycle Route. The coast at Flamborough offers recreation opportunities for visitors with its heritage coastline, caravan parks and RSPB Bempton Nature Reserve, as do the Country Estate and Parklands at Sledmere and Burton Agnes.	Regional	Although the NCA has a low density of public rights of way, it offers varied recreation and access opportunities inland, along the coast and to sites of historical interest. However, there is scope for further joining up of main routes to the permissive paths.	There are opportunities to improve access by ensuring that paths are well maintained and signposted, and that some surfaced paths are provided for use by all levels of ability and interest in key locations. Improve and extend access to recreation for a wide range of users by developing shorter circular routes linked to historic sites, cycle routes, bridleways, National Trails, development of easy access walks and educational packs. Improve interpretation and development of green tourism opportunities. Expansion of the coastal path in the long term to link to the Cleveland Way through the Coastal Access (from Filey to Speeton), which includes Flamborough Head.	**Recreation** **Tranquillity** **Sense of history** **Sense of place/ inspiration** **Biodiversity** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	International and national designations Semi-natural/priority habitats (lowland calcareous grassland, broadleaved woodland, maritime cliffs and slope, chalk rivers and streams)	International and National Nature conservation designations currently cover the coast - Flamborough Head (SAC and SPA) and Bempton Cliffs (part of Flamborough Head SPA). Flamborough is also designated as Heritage Coast. There are 38 SSSI with the majority being in unfavourable recovering condition.	Local	Improving the biological condition of the designated resource is likely to involve sustainable land management activities, principally through maintenance and increase in coverage of semi-natural habitats (creating buffer strips, extending grasslands along field margins and slopes, maintenance and improvement of natural hydrological systems, employing sensitive grazing regimes and creating a network of woodlands in appropriate places) These will also help to increase/improve regulating services such as water quality and soil erosion, while contributing to sense of place.	Protect SSSI and priority habitats; species-rich grasslands, broadleaved woodlands, maritime cliffs and slopes. Buffer the designated resource by planting nectar-rich seed mixes and grassland strips to create an ecological network of habitats around and between farmland. This will also benefit butterflies and moths species such as marbled white, brown argus and cistus forester. Restore and maintain cliff top habitats by creating buffer strips and reversion to grassland. Encourage management practices to benefit farmland birds such as grey partridge, lapwing, turtle dove, yellow wagtail, tree sparrow, corn bunting, quail, barn owl and yellowhammer by providing bird seed crops (winter food source) and creating flower strips and grass margins (summer nesting habitats). Increase chalk grasslands on sloping arable land where it is unsuitable for arable production. Improve condition of chalk streams and associated riparian habitats by creating buffer strips alongside streams.	**Biodiversity** **Recreation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Water availability** **Sense of place/ inspiration** **Tranquillity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Designated geological sites: Exposures in old quarries Flamborough head cliffs	There are currently 4 nationallydesignated geological sites and 4 of geological and biodiversity interest within the NCA. These consist mainly of man-made exposures (disused chalk quarries) and sea caves.	Local	Designated sites provide important opportunities for interpretation, understanding and research into the geodiversity of the NCA. Exposure of these features contributes towards the sense of place, history and biodiversity.	Need to protect designated areas and interpret them to a wide audience while developing visitor opportunities and access where appropriate.	**Geodiversity** **Biodiversity** **Sense of history** **Sense of place/ inspiration** **Recreation**

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